COLUMBIA FALLS OPERATION

ANACONDA ALUMINUM COMPANY
PRIMARY REDUCTION OPERATIONS
COLUMBIA FALLS, MONTANA

1982 LRP STRATEGY GUIDELINES

I. Improve product flexibility and quality of metal from the cast house to react to market conditions.

   A. Single pit casting complex

   B. Double pit casting complex (opportunity)

II. Place a major emphasis on cost efficiency.

   A. Cost reduction opportunities

   B. Productivity improvements

III. Maintain all facilities to prevent obsolescence and assure a responsibly safe and environmental operation.

   A. Capital replacement program

   B. Administrative action programs

   C. Environmental efforts

IV. Evaluate the opportunity for expansion for primary aluminum capacity or for upgrading the technology of the existing operation.

   A. Technology upgrade

   B. Prebake study

ANACONDA ALUMINUM COMPANY
PRIMARY REDUCTION OPERATIONS
COLUMBIA FALLS, MONTANA

1982 LRP ACTION PROGRAMS

STRATEGY I. Improve product flexibility and quality of metal from the cast house to react to market conditions.

A. Single pit casting complex

This action program as provided in the capital portion of the LRP includes a one-pit D.C. casting operation capable of providing large 300" x 30" sheet ingot. This pit will provide can stock ingot which ties into the Company's marketing strategy. Columbia Falls has been designated to provide 218$\overline{M}$ annual lbs. of sheet ingot for Logan.

Used beverage cans (UBC) remelt metal will also be introduced into the Columbia Falls casting operation. A cast house operating on smelter output only will always have surplus idle capacities because capacities are based on minimum efficiencies. Adequate equipment uptime must be allowed to cast each day's molten metal requirements. Remelt metal will permit our casting operation to run more efficiently because it utilizes some of this surplus idle capacity.

The estimated project cost is approximately \$39$\overline{M}$, beginning in 1982, with completion in 1984. Catalytic, Inc. will be the Engineering Contractor on this project, and Dick Chapman, of the Major Projects Group, is the Project Manager.

This action program will require operating a portion of the old casting facility, as well as the new single pit complex. The necessity

to run a dual operation will require additional manpower for furnace operators, scalemen, pouring crews, and some other miscellaneous personnel. Some capital equipment will also be duplicated. A split operation will preclude our ability to standardize an efficient metal handling system. Also, the older, less energy efficient furnaces and the need to keep standby furnaces warm will increase our overall natural gas usage. The advantages of a two-pit complex will be addressed in more detail as an opportunity action program under this same strategy.

This project has an impact on several other areas of the plant. Constructing a single pit and still maintaining the old casting operation will have a significant effect on the Maintenance Department, especially in the area of furnace rebuild. Another area which is impacted by this action program is laboratory operations. Although selection of one or two pits does not affect the lab directly, any time a change in product is required from the cast house, metal analysis is impacted. The lab will be very involved in the qualification process for the new can stock, as well as maintaining all other metal analysis requirements.

B. Double pit casting complex (opportunity)

The second action program under the product flexibility strategy is an opportunity project to construct a two-pit casting facility instead of the split operation mentioned in the previous action program. Expandability to a two-pit operation was built into the original scope of the one-pit complex in that the second pit was dug with the concrete foundations installed and adequate building space was included.

The primary benefit resulting from this opportunity project is not having to staff two casting operations. Approximately 30 additional people are required in a split casting operation. The majority of these people is made of furnace operators, pourers and helpers. One additional salaried foreman technician is also required.

In addition to labor requirements, a split operation would have significant increases in maintenance requirements. Maintaining the old facility with older furnaces, as well as maintaining standby furnaces, is a more costly option. The older furnaces are also less efficient in terms of natural gas consumption. By using the most recent furnace and casting technology in a two-pit facility, natural gas consumption per pound of aluminum produced would decrease.

Another impact due to a split operation would be the inability to standardize a metal handling operation. There would also be increased capital equipment costs for an additional dross press and ingot saw.

Also included as an opportunity project in the LRP is conversion to lithium bath in the potline operation. The old casting complex would require special filters to remove lithium from foil stock. Two to three filters would be necessary at a cost of approximately $500M each. This cost could be bypassed with a combined casting facility.

Additional equipment cost for a two-pit casting operation is approximately 8.0\overline{M}$. This casting complex would have the ability to provide product for either Logan or Terre Haute operations, depending on market requirements. Maintenance efforts and lab operations impact would be reduced by a two-pit casting facility.

Initial evaluations indicate return for a two-pit operation over the one pit is approximately 34 percent, based on a 15-year life. As evaluations of this project continue, Harold Lockhart will be the Project Leader.

STRATEGY II. Place a major emphasis on cost efficiency.

A. Cost reduction opportunities

Several cost reduction projects will be started in 1982 and the study of future opportunities will continue. Due to equipment delivery time, spending will not begin until 1983.

The dross recovery press was recently approved for Columbia Falls. This is part of Phase I of the total Company effort for dross recovery. This portion, as it pertains to the Columbia Falls operation, will increase aluminum recovery through dross processing by pressing the hot dross. Return on this project based on 1981 LRP assumptions is approximately 170 percent. Total realization of this return will not happen without full production and stabilized metal prices. The Project Leader for the dross recovery press is Britt Bell and the estimated cost is $202M.

Another cost reduction effort is the natural gas conservation project. This is a three-year project beginning in 1982. The main thrust of this project is elimination of the district steam system, which will be replaced by individual heating units in the various buildings. Currently, this boiler system is operated year-round, causing both inefficient use of manpower and natural gas during the warmer months. The casting steam cleaners will be replaced in 1982 by portable steam cleaning units rather than those tied into the central system. By 1984 the boiler will be able to be shut down and the operator position eliminated. When this project is completed, the expected return is 93% and the payback is 2.9 years. Phil Sauer has been Project Leader during development and will continue until actual construction begins. The estimated cost of the project is $918M.

The Reduction Department is currently studying the future possibility of lithium bath in the potroom operation. The use of lithium will reduce electrical resistance in the cells and allow them to run cooler, which will reduce energy costs; however, development is not complete to implement this program on a plant-wide basis. A test period will begin in 1982 for usage of lithium. During this test period, the lab will also have the opportunity to analyze the effects of lithium bath on final product. Until the results of the lithium test are complete, this project is considered an opportunity project. Although no capital funds are necessary for plant-wide conversion to lithium, $1,878M of lithium additives will be necessary for the initial saturation of the cells. This amount will be a working capital change during the implementation period. Annual energy savings is expected to be $974M. The potential also exists for production increases and environmental benefits. Nino Berube is Project Leader during the test period for this project.

The final major project for cost reduction over the five-year period is improved process control through the computer. In 1982 we began the three-year conversion from our present IBM 1800 computer to the new IBM Series/1 process control system. One new computer project being undertaken will develop an improved computer controlled means of suppressing anode effects. This will involve increased monitoring of cell voltages for more accurate prediction of anode effects. When an anode effect is predicted, the alumina charging system will be activated by the computer to replenish the amount of alumina concentration in the bath. It is expected that this project will provide an annual energy savings of approximately $1M.

Another computer-related project during the plan period is software development which will result in smaller, more frequent ore charges to avoid mucking the cells. THe expected annual energy savings is about $86M.

Both of these projects will require design and installation of automated ore feeders. Development of this charging system is addressed under Strategy IV. Dave Alzheimer is the Project Leader for all computer-related aspects of these projects.

B. Productivity improvements

Columbia Falls has several programs and projects underway to improve productivity and reduce materials per ton of aluminum produced.

The manpower improvement program in the Reduction Department is one such program. Under this program, manpower utilization is constantly reviewed for better utilization and productivity. An example of past results of this program is the combining of jack-slipping and pin-setting functions. By doing this, the plant was able to increase productivity and reduce the overall workforce. These efforts will continue during the plan period for other such improvements.

A time study was just completed within the Field Maintenance Department which will eventually result in recommendations for productivity improvements. These improvements will result from improved planning, scheduling, training and preventive maintenance programs. The goal for improvement is to increase productivity by five percent in each year from 1982 through 1985.

One opportunity project is an automatic pin-sorting system which would reduce manpower needs. This project must be part of a centralized pin-cleaning and pin-processing system for the best effectiveness. This is a manpower intensive activity to sort the pins throughout the five-line operation. Since some on-crane pin-cleaning technology is being tested, this project is classified as an opportunity project, contingent on the results of that development. Total cost has not been estimated at this time and no Project Leader has been assigned.

STRATEGY III. Maintain all facilities to prevent obsolescence and assure a responsibly safe and environmental operation.

A. Capital replacement program

The paste plant is basically a 27-year old facility which has had several minor upgrades through the years, especially in the electrial area. Two million dollars is included in the capital program of the LRP for electrical upgrade, $250M in 1982, with the balance in 1983. This electrical upgrade will bring the paste plant within compliance with the National Electric Code.

Highlights of this upgrade will be a new automated control system which includes upgrading of all electrical systems, additional feedback devises and replacement of some existing equipment. A new lighting system with vapor-tight fixtures, isolated panels and replacement of service receptacles is also proposed. Modifications will also be made to current access/egress requirements. Another $1.5M has been provided in the risk and uncertainty category for additional upgrade in the paste plant for dust collection, machinery upgrades and transfer systems. As the paste plant electrical design progresses, these other areas will be further defined as to necessary modifications.

Harmonic Suppression - The Bonneville Power Administration (BPA) claims that excessive harmonic noise from our system is causing damage to their equipment and could result in a communications interference within the Flathead Valley. A 1982 budgeted project has been approved to install capacitors within the normal potline operating banks for $61M. Written directives have not been received from the BPA which will require installing capacitors on our spare banks.

The cost of these capacitors for spare banks is approximately $100M and is classified as a risk and uncertainty project until further notice from BPA. Duane Toavs is the Project Leader for these projects.

One major capital project for improving productivity is the Phase II upgrade of the rectifier computer. This project will add sequential monitoring of relays and circuit breakers in the control station and switch yard. This will assist the operator and electrician in troubleshooting and thus minimize potline downtime during unscheduled systems failures. Merle Ballensky is the Project Leader and the implementation will be completed in 1983.

An additional petroleum coke storage facility is planned for 1983. Recently we have been testing ARCO coke in potline operations. These tests have proven favorable; however, because of the makeup of the coke, it is necessary to store this separately from other petroleum coke inventory. The cost of an additional petroleum coke silo will be approximately $450M and the Project Leader will be John Free.

A continuing vehicle replacement program will be maintained to insure a reliable, maintainable and safe plant vehicle fleet. Although different classes of vehicles are replaced on varying lifetimes, the goal for the average life for the vehicle fleet in the plant is five years. Many of the present vehicles which have been replaced in recent years have been due to the unavailability of replacement parts. The capital cost of the vehicle replacements varies from year to year and is broken down in the capital program of the LRP. The Project Leader for the vehicle replacement project is Jack Hinman.

Emergency Power Generator Upgrade - The existing emergency power units were installed during original plant construction. The addition of Lines 3, 4 and 5 increased the emergency load on this system.. This project includes the design and replacement of the emergency power generating and control system with a capacity which will meet the minimum plant requirements necessary in the event of a major power outage. The cost of this project is $180M in 1983 and Paul Kelley will be the Project Leader.

B. Administrative action programs

A significant portion of the operating budget is directed toward preventing obsolescence and maintaining the overall plant. As an example, in 1981 maintenance contributed 21.5 percent of the total cost of operations outside of power and raw materials.

The Field Maintenance Department has begun developing histories for various pieces of equipment which will lead to more effective preventive maintenance program. The end results of these programs will aid in manpower productivity improvements and a more effective control of material inventories as they relate to maintenance functions.

Another administrative program which relates to the vehicle replacement is the effort to standardize vehicle chassis, drive lines and engines. The benefit of this standardization is a decrease in overall warehouse levels for spares by making parts interchangeable for more than one vehicle group.

We have recently taken delivery of two new vacuum sweepers from Switzerland which are now being tested. With these vehicles, we are planning to provide a cleaner work environment and reduce alumina migrations into the potroom basements. Depending on how these vacuum sweeper trucks work in relation to our overall sweepings program, we have included $300M for purchase of three more vehicles as a risk and uncertainty project in the LRP. Other administrative programs have been addressed under productivity improvements in the previous strategy.

C. Environmental efforts

One goal of the 1981 LRP was to obtain favorable legislation as it relates to air quality and emissions standards for our operations. Another goal was to establish a manageable hazardous waste program. These goals were virtually attained during 1981; however, we have included in the risk and uncertainty category the following projects:

Our hazardous waste program complies with the current regulations but since such items such as old pot bottoms have been listed and were recently delisted, we have included $800M in this category in the event that expansion becomes necessary for our hazardous waste site.

Upgrade Anode Dust Control System for ARCO Coke - One quality in the makeup of the ARCO coke is that it is usually finer and causes more dusting problems. A $400M project to improve the dust control system in the paste plant for ARCO coke is included as a risk and uncertainty project in the LRP. This project would include increased capacity for anode dust control, baghouses, and ductwork additions at various points in the paste plant.

The bath crushing operation for the plant is currently performed on a contract basis. This contractor's equipment provides no dust control apparatus. Although no citations have been received from the Montana Department of Health and Environmental Sciences, our local Industrial Hygiene and Safety people have expressed concern over this operation. We have included $1,600M in the risk and uncertainty category because of this exposure. If this project is undertaken, this amount would include a more effective handling system, as well as emission controls.

STRATEGY IV. Evaluate the opportunity for expansion for primary aluminum capacity or for upgrading the technology of the existing operation.

A. Technology upgrade

Our latest technology upgrade has been the Sumitomo project, which is virtually complete. We have included in the LRP an opportunity project called the Technology Improvement Program (TIP). This is a 10-point opportunity upgrade for the potroom operations. Three projects previously mentioned in action programs are the lithium bath, anode effect suppression and enhanced computer control for ore charging.

We are in the process of evaluating anode and cathode technology which has been established by Mitsubishi Light Metal Industries in Japan. The anode technology deals with improved primary and secondary formulation and the cathode technology involves changes in the cathode block, collector bar and joint.

An automated ore charging system is being evaluated which would convert the automatic crust breaker cylinders into point feeders. This would provide better control and less mucking in the cell. Manpower savings for this project is estimated to be 52 persons.

An established fact in the industry is that pin cleaning can reduce voltage loss and improve metal purity. Work is currently underway on a portable pin cleaner which has potential for crane mounting. Ultimate plans for this project include development of a self-feeding and ejection mechanism so that the crane operators' lost time in pin cleaning would be minimal.

During the conversion to the Sumitomo technology, anodes were widened; however, the buswork was not. This causes a disproportionate amount of current to flow through the outer row of pins on the anode. Three pots from previous wide bus testing are still in service so direct comparisons can be made. Our studies show substantial gains in amperage levels, current efficiency, and anode drop are possible by widening anode bus. Preliminary studies are underway to determine the best approach for making this change.

Several cathode shell improvements were made with the Sumitomo project; however, autopsies of failed pots indicate needless failures still occur because of weakness in the upper sidewall. We believe these problems can be corrected by additional cradle strength, corner reinforcement and upper sidewall strength. Based on comparisons with other VSS plants, it is estimated that this modification could extend pot life by one year.

ASV, a Norwegian aluminum company, has performed a magnetics analysis on the Columbia Falls cell and discovered a correctable problem. The necessary changes will include buswork rearrangements on the anode that will give an asymmetric bus configuration. Preliminary design of these changes has been done by the Columbia Falls staff and is being evaluated by ASV and the R & D group in Tucson.

Total estimated capital requirements for the TIP program including working capital is approximately $26M. A combined annual savings from the program is expected to be $18M. During 1982 test programs for several of these projects are budgeted. Implementation of the entire program is contingent on test results and availability of funding. We currently plan for incorporation of this TIP program into the LRP sometime during the 1983-87 period. Tom Payne is in charge of this overall program.

B. Prebake study

To remain competitive within the industry, the plant must constantly seek opportunities to improve, upgrade and expand our operations. In this effort, a Columbia Falls Planning Study was initiated in late 1981. A retrofit of the existing Columbia Falls VSS cells to a modern, high amperage prebake cell was considered. The resulting recommendation is that this option should be reconsidered when additional primary metal units are required to meet the Company's marketing efforts. The feasibility of prebake conversion will be re-evaluated annually. Capital costs will be contingent on the extent of the conversion, as well as timing. Don McMillan will be in charge of the ongoing evaluation process.

1982 LONG RANGE PLAN
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1982 LRP ASSUMPTIONS

1. No strikes or work stoppages.

2. Total implementation of the proposed 1982 LRP.

3. Finished metal transfers are as follows:

	1982	1983	1984	1985	1986	1987
Sheet	210,742	233,500	330,100	368,342	376,136	382,336
Pig	204					
"T" Ingot	5,573	18,616	26,840			
RSI (Sow)	1,212	1,322	1,949	2,011	2,053	2,087
Total:	217,731	253,438	358,889	370,353	378,189	384,423

4. No shortages of critical raw materials.

5. Inflation, price and economic indicators of the "Weak Price Scenario" supplied by Corporate are correct.

6. No unexpected capital spending for governmental regulations that will alter LRP capital or affect plant operating performance.

7. Potroom operating parameters:

	1982	1983	1984	1985	1986	1987
Avg. Amp.	102,500	102,500	103,000	103,000	103,000	103,000
Cells Rebuilt	52	138	125	122	100	100
Cells Operating	369	434	593	593	594	594
#Al_2O_3/#Al	1.94	1.94	1.94	1.94	1.94	1.94

8. Columbia Falls operation will be at full production by late November 1983.

9. Cast house construction will be completed by July 1984 and operations will begin in September 1984 after a two-month start up phase.

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ASSUMPTIONS/OBJECTIVES

	1982	1983	1984	1985	1986	1987	ASSUMPTION OR OBJECTIVE *
Delivered Cost/Ton:							
Alumina	287.88	324.34	358.16	401.37	435.32	479.03	Assumption
Aluminum Fluoride	948.84	1,026.12	1,116.09	1,205.03	1,313.94	1,449.20	Assumption
Cryolite	755.55	802.12	860.09	934.03	1,011.94	1,105.20	Assumption
Pet Coke	170.95	199.55	228.21	248.71	271.21	295.33	Assumption
Anode Pitch	338.00	371.06	426.33	463.68	506.03	549.09	Assumption
Statistics:							
Ampere Efficiency	87.60	84.30	87.20	87.30	87.60	87.70	Objective
DCKWH/Lb.	7.71	8.00	7.80	7.79	7.67	7.67	Objective
Pot Days	134,685	158,410	217,038	216,445	216,810	216,810	Assumption
Pot Rebuilds	52	138	125	122	100	100	Assumption
Pot Rebuild Days	N/A	N/A	2,562	2,555	2,190	2,190	Assumption
Cost/Pot Rebuild	59,149	63,763	68,354	73,344	78,478	83,893	Assumption
Manhours/Ton	16.59	15.53	11.45	11.13	10.89	10.70	Objective

*Note if the indicator is an assumption or an objective

N/A - these indicators are meaningless due to the curtailment situation.

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CAPITAL PROGRAM SUMMARY ($MM)

	L.E.	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR	TOTAL YEAR 1 - YEAR 5
Strategy 1 Projects							
Capital	3.52	24.17	9.71	--	--	--	33.88
Working Capital	--	--	1.00	--	--	--	1.00
Total	3.52	24.17	10.71	--	--	--	34.88
Strategy 2 Projects							
Capital	.41	1.04	.78	--	.15	.65	2.62
Working Capital	.13	--	--	--	--	--	.13
Total	.54	1.04	.78	--	.15	.65	2.75
Strategy 3 Projects							
Capital	2.85	7.59	1.81	1.82	1.38	1.72	14.32
Working Capital	--	--	--	--	--	--	--
Total	2.85	7.59	1.81	1.82	1.38	1.72	14.32
Strategy 4 Projects							
Capital	.09	.54	--	--	--	--	.54
Working Capital	--	--	--	--	--	--	--
Total	.09	.54	--	--	--	--	.54
TOTALS:							
Capital (Less Working Capital)	6.87	33.34	12.30	1.82	1.53	2.37	51.36
Working Capital	.13	--	1.00	--	--	--	1.00
TOTAL CAPITAL PROGRAM	7.00	38.34	8.30	1.82	1.53	2.37	52.36
TOTAL WITHOUT CAST HOUSE	3.48	9.57	2.59	1.82	1.53	2.37	17.88
TOTAL WITH TIP*	--	12.30	13.80	10.20	4.00	5.40	45.70

*Added during LRP 2 (official guideline)

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CAPITAL PROGRAM LISTING ($MM)

STRATEGY 1. Improve product flexibility and quality of metal from the cast house to react to market conditions.

CATEGORY	PRIOR SPENDING	L.E.	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR
Capital Projects:							
1. CAST HOUSE	Expansion						
Capital		3.52	28.77	4.71			
Working Capital				1.00			
Total		3.52	28.77	5.71			
2. METAL HANDLING	Expansion						
Capital			.30				
Working Capital							
Total			.30				
3. PURITY IMPROVEMENT	Expansion						
Capital			.10				
Working Capital							
Total			.10				
TOTAL:		3.52	29.57	5.71			

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1982 LRP CAPITAL PROGRAM BY STRATEGY

1. Improve product flexibility and quality of metal from the cast house to react to market conditions.

Title	Amount
Opportunity Projects: ($M)	
Metal Handling	1.7
Double-Pit Casting Facility (incremental increase)	8.0

(Revised 5-7-82)

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CAPITAL PROGRAM LISTING ($\overline{M}$)

Strategy: 2. Place a major emphasis on cost efficiency.

	CATEGORY	PRIOR SPENDING	L.E.	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR
Capital Projects:								
1. SUMITOMO	Cost Reduction							
	Capital	39.50	.38	.35				
	Working Capital		.13					
	Total	39.50	.51	.35				
2. DROSS RECOVERY	Cost Reduction							
	Capital			.20				
	Working Capital							
	Total			.20				
3. NATURAL GAS CONSERVATION	Energy							
	Capital		.01	.20	.73			
	Working Capital							
	Total		.01	.20	.73			
OTHERS		.09	1.02	.29	.05		.15	.65
TOTAL:		39.59	.54	1.04	.78		.15	.65

(Revised 5-7-82)

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1982 LRP CAPITAL PROGRAM BY STRATEGY

2. Place a major emphasis on cost efficiency.

Title	Amount
Opportunity Projects: ($\bar{M}$)	
Lithium Bath	1.9
Automatic Pin Sorting	.1
Risk and Uncertainty Projects: ($\bar{M}$)	
Desegregation in Bulk Storage	.1

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CAPITAL PROGRAM LISTING ($\overline{M}$)

Strategy: 3. Maintain present facilities to prevent obsolescence and assure a responsibly safe and environmental operation.

	CATEGORY	PRIOR SPENDING	L.E.	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR
Capital Projects:								
1 . E.C.L. MACHINES	Maintenance							
Capital		2.42	1.30	.58				
Working Capital								
Total		2.42	1.30	.58				
2 . VACUUM EQUIPMENT	Maintenance							
Capital		.31	.25					
Working Capital								
Total		.31	.25					
3 . PASTE PLANT SCALES	Maintenance							
Capital		.11	.11					
Working Capital								
Total		.11	.11					

(Revised 5-20-82)

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CAPITAL PROGRAM LISTING ($M)

Strategy: 3. Maintain present facilities to prevent obsolescence and assure a responsibly safe and environmental operation

	CATEGORY	PRIOR SPENDING	L.E.	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR
Capital Projects:								
4. FIELD MAINTENANCE FACILITY/SHED 19	Maintenance							
	Capital	.08	.21					
	Working Capital							
	Total	.08	.21					
5. BULK STORAGE BLDG.	Maintenance							
	Capital	.18	.18	.05				
	Working Capital							
	Total	.18	.18	.05				
6. NEW QUANTOMETER	Maintenance							
	Capital	.05	.13					
	Working Capital							
	Total	.05	.13					

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CAPITAL PROGRAM LISTING ($M)

Strategy: 3. Maintain present facilities to prevent obsolescence and assure a responsibly safe and environmental operation.

	CATEGORY	PRIOR SPENDING	L.E.	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR
Capital Projects:								
7. REPLACE PROCESS COMPUTER	Maintenance							
Capital			.05	.69	.56			
Working Capital								
Total			.05	.69	.56			
8. PASTE PLANT ELECTRICAL UPGRADE DESIGN	Maintenance							
Capital			.25	1.75				
Working Capital								
Total			.25	1.75				
9. LAB HEATING, ELECTRICAL, VENTILATION UPGRADE	Maintenance							
Capital		.04		.33				
Working Capital								
Total		.04		.33				

(Revised 5-7-82)

1982 LONG RANGE PLAN
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CAPITAL PROGRAM LISTING ($\overline{M}$)

Strategy: 3. Maintain present facilities to prevent obsolescence and assure a responsibly safe and environmental operation.

	CATEGORY	PRIOR SPENDING	L.E.	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR
Capital Projects:								
10. VEHICLE REPLACEMENT	Maintenance							
Capital			.15	1.16	.56	.87	.90	.84
Working Capital								
Total			.15	1.16	.56	.87	.90	.84
11. RECTIFIER COMPUTER - PHASE II	Maintenance							
Capital				.19				
Working Capital								
Total				.19				
12. TWO 75T WORK CRANES	Maintenance							
Capital				.65				
Working Capital								
Total				.65				

(Revised 5-7-82)

1982 LONG RANGE PLAN
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CAPITAL PROGRAM LISTING ($\bar{M}$)

Strategy: 3. Maintain present facilities to prevent obsolescence and assure a responsibly safe and environmental operation.

CATEGORY	PRIOR SPENDING	L.E.	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR
Capital Projects:							
13. EMERGENCY POWER GENERATOR UPGRADE	Maintenance						
Capital			.18				
Working Capital							
Total			.18				
14. ALTERNATE SUBSTATION FEEDERS	Maintenance						
Capital			.25				
Working Capital							
Total			.25				
15. ADDITIONAL PETROLEUM COKE STORAGE	Maintenance						
Capital			.45				
Working Capital							
Total			.45				

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CAPITAL PROGRAM LISTING ($M)

Strategy: 3. Maintain present facilities to prevent obsolescence and assure a responsibly safe and environmental operation.

	CATEGORY	PRIOR SPENDING	L.E.	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR
Capital Projects:								
16. YARD STORAGE AREA	Maintenance							
Capital				.30				
Working Capital								
Total				.30				
17. ANODE SIDE ABRADER	Maintenance							
Capital				.10				
Working Capital								
Total				.10				
18. TWO 20-INCH LATHES	Maintenance							
Capital				.12		.14		
Working Capital								
Total				.12		.14		
OTHERS		.78	.22	.79	.69	.81	.48	.88
TOTAL:		3.97	2.85	7.59	1.81	1.82	1.38	1.72

(Revised 5-7-82)

1982 LONG RANGE PLAN
REDUCTION DIVISION
COLUMBIA FALLS OPERATION

1982 LRP CAPITAL PROGRAM BY STRATEGY

3. Maintain present facilities to prevent obsolescence and assure a responsibly safe and environmental operation.

Title	Amount
Risk and Uncertainty Projects: ($M)	
Pot Jack Emergency Trip	.1
Bath Crushing Facility	1.6
Convert Fume Collection to Negative Pressure	5.0
Upgrade Anode Dust Control System for ARCO Coke	.4
3 Vacuum Vehicles	.3
Mixer Fume Control Paste Plant	.1
Spare Bank Stepdown Transformer	1.0
Paste Plant Electrical Upgrade	1.0
Additional Air Compressor	.1
Hazardous Waste Landfill	.8
Harmonic Suppression for Spare Banks	.1
Others	.3

1982 LONG RANGE PLAN
REDUCTION DIVISION
COLUMBIA FALLS OPERATION

CAPITAL PROGRAM LISTING ($M)

Strategy: 4. Evaluate the expansion of primary aluminum capacity on the upgrading of technology for the existing operation.

	CATEGORY	PRIOR SPENDING	L.E.	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR
Capital Projects:								
1. MITSUBISHI OPTION TEST	Expansion							
Capital			.09	.25				
Working Capital								
Total			.09	.25				
2. PRODUCTION EXPANSION STUDY	Expansion							
Capital				.13				
Working Capital								
Total				.13				
OTHERS		.14		.16				
TOTAL:		.14	.09	.54				

(Revised 5-7-82)

1982 LONG RANGE PLAN
REDUCTION DIVISION
COLUMBIA FALLS OPERATION

1982 LRP CAPITAL PROGRAM BY STRATEGY

4. Evaluate the expansion of primary aluminum capacity or the upgrading of technology for the existing operation.

Title	Amount
Opportunity Projects: ($M)	
ASV Magnetics	3.3
Mitsubishi Anode	2.4
Mitsubishi Cathode	.5
Point Ore Feeders	3.0
Pin Cleaning	1.1
Anode Bus Widening	3.0
New Buswork	24.0
Improved Cathode Shell	9.0
Cell Life Improvement	11.8
E.C.L. Clamps	6.2
Jack Slipping Operations (E.C.L. clamps required)	.7
Pre-bake Conversion	305.0

1982 LONG RANGE PLAN
REDUCTION DIVISION
COLUMBIA FALLS OPERATION

MANPOWER REQUIREMENTS (END OF YEAR)

	1981 Actual	1982 L.E.	1983 PLAN	1984 PLAN	1985 PLAN	1986 PLAN	1987 PLAN
SALARY EXEMPT	196	184	188	189	188	189	189
SALARY NON-EXEMPT	126	114	117	116	116	115	115
TOTAL SALARY	322	298	305	305	304	304	304
HOURLY	810	615	782	785	780	780	779
TOTAL EMPLOYEES	1132	913	1087	1090	1084	1084	1083

SECONDED EMPLOYEES (EXCLUDED FROM ABOVE):

COMMENTS:

1) Production is curtailed to 60% throughout 1982.
2) Production returns to 100% by fourth quarter 1983. Accelerated pot rebuild schedule throughout 1983.
3) Thirteen additional hourly employees are necessary for the new casting facility in 1984. This increase is partially offset by productivity improvements in Field Maintenance and return to a normal pot rebuild schedule in 1984.
4) More productivity improvements by Field Maintenance in 1985.
5) All manpower numbers are supported by the LRP Assumptions and Capital Program. Manpower planning numbers furnished to Corporate Employee Relations include full implementation of the TIP program, as well as some differences in casting manpower.

V. HUMAN RESOURCES - ISSUES AND STRATEGIES

a. Explain/define problems or concerns for each issue listed below.

b. Explain your plans or strategies for resolving problems and addressing concerns for each issue listed below.

1. Training and Development for Management, Non-Exempt, Hourly:

a. Training and development for management level employees will continue in the form of cross-training assignments and/or internal and external experiences as defined by the MAP-D exercises.

b. Training and development for lower level exempt and non-exempt employees is planned in the form of continued Continuum I, supervisory training, MBP programs and departmental level programs which address expressed needs.

c. Hourly level skills and task training will be continued in the Reduction and Field Maintenance groups, and will be developed for other major hourly groups.

2. Industrial/Labor Relations:

Maintain the responsible/productive Industrial and Labor Relations atmosphere that currently exists through continued skill development of the craft workforce and through continuing communications efforts.

3. Employee Communications:

Employee communications exist as, and will continue to be direct lines through the immediate supervisor; through the plant bulletin board system; and through direct mail efforts to the employees' residence.

4. Employee Relations Systems:

5. Governmental Regulations Including Environmental Requirements:

Governmental regulations, including environmental requirements will be coordinated through the Technical Department as required. Should the effort require direct political contact, the Governmental Affairs Manager becomes involved.

6. Employment: Number and Types of People Hired:

The third quarter of 1983 will require 19 additional hourly employees who will be concerned with the start-up of the curtailed production. By year-end 1984 these 19 and 3 additional will be released as the new Casthouse facility becomes 100% on line.

7. College Recruiting:

College recruiting will continue on an annual basis in order to fill the yearly quota of two Cadre positions and to maintain a pool of high potential professional employees.

8. Recruiting Experienced Management and Technical People. Internal and External.

Recruiting of experienced personnel will only take place to fill vacancies that demand experience and capabilities not found within the Corporation.

9. Equal Employment Opportunity/Affirmative Action:

Equal Employment Opportunity/Affirmative Action commitments will continue foremost in consideration when filling vacant positions with the best qualified candidate.

10. Salaries and Benefits:

Salaries and benefits are expected to remain sufficiently competitive so as to attract highly qualified employees.

11. Compensation:

Compensation is expected to remain sufficiently competitive so as to attract highly qualified employees.

12. Organizational Structure:

The organizational structure will be continually examined so as to maintain a flexible and competent management/supervisory staff.

13. Productivity:

The productivity of the workforce will continue to be examined so as to assure that the Columbia Falls plant will be the most competitive in the industry.

1982 LONG RANGE PLAN
REDUCTION DIVISION
COLUMBIA FALLS OPERATION

METAL PLAN - In Thousands of Pounds

	1982 L.E.	1983	1984	1985	1986	1987
BEGINNING INVENTORY:						
Working	22,664	20,678	9,392	12,071	14,793	17,865
Finished Goods	214,458	240,830	347,787	347,400	349,628	350,318
PRIMARY PRODUCTION - NET						
PURCHASES - SOURCE & TYPE						
Purchased UBC Sow			12,000	24,000	30,000	36,000
INTRA-COMPANY TRANSFERS IN:						
SOURCE & TYPE						
RSI	1,201	1,322	1,949	2,011	2,053	2,087
TOTAL AVAILABLE	238,323	262,830	371,128	385,482	396,474	406,270
NET SALES TO CUSTOMER:						
PRODUCT LINE						
T-Ingot	5,500	18,616	26,840			
Pig	202					
Sheet	742					
RSI	1,201	1,322	1,949	2,011	2,053	2,087
Total	7,645	19,938	28,789	2,011	2,053	2,087
INTRA-COMPANY TRANSFERS OUT:						
CUSTOMER & TYPE						
Sheet	210,000	233,500	330,100	368,342	376,136	382,336
TOTAL SALES	217,645	253,438	358,889	370,353	378,189	384,423
SHRINKAGE ON PURCHASED SCRAP			168	336	420	504
ENDING INVENTORY:						
Working	20,678	9,392	12,071	14,793	17,865	21,343
Finished Goods						

ANACONDA ALUMINUM COMPANY
INCOME STATEMENT
1982 LONG RANGE PLAN
(IN MILLIONS OF DOLLARS)
COLUMBIA FALLS OPERATION

	ACTUAL 1981	EST/ACT 1982	1983	1984	1985	1986	1987
SALES POUNDS:							
CUSTOMER	25.2	7.7	19.9	28.8	2.0	2.1	2.1
INTRA-COMPANY	289.9	210.0	233.5	330.1	368.4	376.1	382.3
TOTAL	315.1	217.7	253.4	358.9	370.4	378.2	384.4
SALES DOLLARS:							
CUSTOMER	18.4	5.3	18.2	30.0	2.1	2.3	2.5
INTRA-COMPANY	221.0	168.5	216.7	349.4	441.5	488.5	527.2
TOTAL	239.4	173.8	234.9	379.4	443.6	490.8	529.7
VARIABLE COST	176.4	159.1	213.5	311.1	356.1	390.8	432.8
GROSS MARGIN	63.0	14.7	21.4	68.3	87.5	100.0	96.9
PERCENT OF SALES	26.3%	8.5%	9.1%	18.0%	19.7%	20.4%	18.3%
FIXED COST:							
PLANT PERIOD	20.0	19.9	21.1	24.2	26.4	28.6	31.1
SELLING AND ADMINISTRATION	.0	.0	.0	.0	.0	.0	.0
GENERAL OFFICE ADMINISTRATION	.0	.0	.0	.0	.0	.0	.0
R&D	.0	.0	.0	.0	.0	.0	.0
TOTAL	20.0	19.9	21.1	24.2	26.4	28.6	31.1
OPERATING MARGIN	43.0	(5.2)	.3	44.1	61.1	71.4	65.8
DEPRECIATION & AMORTIZATION	5.8	6.5	8.1	10.5	12.8	13.3	13.6
OTHER INCOME(EXPENSE)	.6	.0	.0	.0	.0	.0	.0
INCOME BEFORE FAIR VALUE	37.8	(11.7)	(7.8)	33.6	48.3	58.1	52.2
F.V.A.ADJUSTMENT	(1.9)	(2.0)	(1.4)	(1.4)	(1.4)	(1.4)	(1.4)
INCOME AFTER FAIR VALUE	35.9	(13.7)	(9.2)	32.2	46.9	56.7	50.8
EXTRAORDINARY ITEM	.0	.0	.0	.0	.0	.0	.0
INCOME AFTER EXTRAORDINARY ITEM	35.9	(13.7)	(9.2)	32.2	46.9	56.7	50.8

ANACONDA ALUMINUM COMPANY
FINANCIAL INDICATORS
1982 LONG RANGE PLAN
(IN MILLIONS)
COLUMBIA FALLS OPERATION

	ACTUAL 1981	EST/ACT 1982	1983	1984	1985	1986	1987	TOTAL 1983-1987
SALES POUNDS	315.1	217.7	253.4	358.9	370.4	378.2	384.4	1,745.3
SALES DOLLARS	239.4	173.8	234.9	379.4	443.6	490.8	529.7	2,078.4
INCOME AFTER F.V.A.	35.9	(13.7)	(9.2)	32.2	46.9	56.7	50.8	177.4
INCOME AFTER EXTRAORDINARY ITEM	35.9	(13.7)	(9.2)	32.2	46.9	56.7	50.8	177.4
TOTAL CAPITAL PROGRAM*	7.7	7.5	22.5	29.1	1.8	1.5	2.4	52.3
OPERATING COMPANY CASH FLOW	45.4	(1.6)	(20.3)	22.1	60.6	70.8	61.8	195.0
CAPITAL EMPLOYED	177.9	165.9	178.6	193.0	179.4	165.4	154.6	
ROCE BEFORE TAX %	19.7	(8.0)	(5.3)	17.3	25.2	32.9	31.8	
ENDING INVENTORY-POUNDS	22.7	20.7	9.4	12.1	14.8	17.9	21.3	
EMPLOYEES								
EXEMPT	196	184	188	189	188	189	189	
NON-EXEMPT	126	114	117	116	116	115	115	
HOURLY	810	615	782	785	780	780	779	
TOTAL	1,132	913	1,087	1,090	1,084	1,084	1,083	

* INCLUDES CASH CAPITAL, PROJECT WORKING CAPITAL, EQUITY SPENDING, OFF BALANCE SHEET SPENDING AND INDIRECT FINANCING

1982 LONG RANGE PLAN
WEAK PRICE SCENARIO
REDUCTION DIVISION
COLUMBIA FALLS OPERATION

INCOME ANALYSIS FROM 1981 LRP TO 1982 LRP

	1982 L.E.	1983	1984	1985	1986
OPERATING INCOME:					
1982 LRP	(14.6)	17.0	21.8	33.4	45.2
1981 LRP	25.2	28.9	39.2	51.2	47.7
DIFFERENCE	(39.8)	(45.9)	(17.4)	(17.8)	(2.5)
EXPLANATION OF DIFFERENCES					
SALES PRICE:					
Customer	(1.7)	(2.6)	(4.8)	---	---
Inside	(26.9)	(35.8)	(50.6)	(52.7)	(50.1)
SALES VOLUME & MIX	(20.9)	(18.4)	(3.7)	(2.2)	(.3)
VARIABLE COST:					
Aluminum (Alumina, Bauxite)	10.2	20.0	28.1	30.4	34.6
Other Raw Material	1.7	.1	13.5	7.3	4.9
Labor & Benefits	(2.2)	(1.4)	5.4	6.6	8.5
Energy	(6.2)	(11.2)	(9.5)	(10.4)	(6.2)
Price Elimination in Inventory	5.1	.4	.1	(.1)	---
Other	(1.7)	(2.2)	.1	(.4)	.5
FIXED COST:					
Plant Period	3.0	3.3	3.3	4.1	4.9
Depreciation	(.5)	1.0	(.4)	(1.5)	(.6)
Selling, G & A					
Fair Value Accounting	.1	.7	.7	.7	.7
Other	.2	.2	.4	.4	.6
TOTAL INCOME DIFFERENCE	(39.8)	(45.9)	(17.4)	(17.8)	(2.5)

(Revised 5-20-82)

ANACONDA ALUMINUM COMPANY
PRIMARY REDUCTION OPERATIONS
COLUMBIA FALLS, MONTANA

INCOME ANALYSIS 1981 LRP TO 1982 LRP
VARIANCE COMMENTS

Sales volume and prices are down significantly from the 1981 Long Range Plan. This is due mainly to the currently poor economic conditions resulting in a more realistic look at prices and volumes.

Alumina cost decreased as shown by the per ton cost comparison shown below:

	1982	1983	1984	1985	1986
1981 Plan	273.8	343.0	386.8	425.4	454.5
1982 Plan	287.9	301.2	332.9	369.5	402.8

Process raw material prices are down for all plan years. Consumption rates for these raw materials are up from the previous plan in 1983 and 1984. This increased consumption is caused by the restart program which spans the last half of 1983. Nineteen eighty-two and 1985-86 consumption rates are down slightly from the prior plan.

Labor and benefits are favorable in the latter years of the plan because of increased efficiencies, increased purchased scrap usage and more slowly increasing compensation rates. During 1982 and 1983 the current plan is unfavorably affected by the low production volume and increased labor required for restart.

Electrical energy is significantly unfavorable when compared to the prior plan. This is due to the marked increase in mill rates used as is shown below:

	1982	1983	1984	1985	1986
1981 Plan	15.8	17.2	19.2	20.6	23.0
1982 Plan	18.7	21.7	22.2	24.6	26.3

(Revised 5-20-82)

ANACONDA ALUMINUM COMPANY
PRIMARY REDUCTION OPERATIONS
COLUMBIA FALLS, MONTANA

INCOME ANALYSIS 1981 LRP TO 1982 LRP
VARIANCE COMMENTS (Cont.)

Period costs are favorable to the prior plan due to a general lessening in inflation and an average reduction in salaried work force of 26.

Depreciation is higher in 1984 - 1986 due to the completion of the new casting facility.

(Revised 5-20-82)

1982 LONG RANGE PLAN
WEAK PRICE SCENARIO
REDUCTION DIVISION
COLUMBIA FALLS OPERATION

INCOME ANALYSIS FROM YEAR TO YEAR

(In Millions)

	1982 L.E.	1983	1984	1985	1986	1987
OPERATING INCOME	(14.6)	(17.0)	21.8	33.4	15.2	45.8
DIFFERENCE FROM PRIOR YEAR	(50.5)	(2.4)	38.8	11.6	11.8	.6
EXPLANATION OF DIFFERENCES:						
SALES PRICE:						
Customer	(.4)	3.5	3.4	---	.2	.2
Inside	2.3	22.0	39.9	44.2	37.5	38.3
SALES VOLUME & MIX	(19.0)	1.1	5.3	2.3	1.5	1.4
VARIABLE COST:						
1. Aluminum (Alumina, Bauxite)	(6.2)	(1.7)	(5.8)	(8.5)	(9.2)	(14.2)
2. Other Raw Material	(2.3)	(7.0)	(12.0)	(12.9)	(9.8)	(12.5)
3. Labor and Benefits	(5.1)	(1.0)	6.8	(1.4)	(1.5)	(1.9)
4. Energy	(19.8)	(7.4)	4.6	(5.1)	(2.8)	(4.5)
5. Price Elimination in Inventory	4.3	(6.8)	.1	.2	.2	.3
6. Other	(3.6)	(2.8)	1.4	(3.3)	(2.1)	(4.0)
FIXED COST:						
1. Plant Period	.3	(2.1)	(2.4)	(1.8)	(1.9)	(2.2)
2. Depreciation	(.1)	(.8)	(2.4)	(2.0)	(.2)	(.2)
3. Selling, G & A	---	---	---	---	---	---
4. Fair Value Accounting	(.9)	.6	(.1)	(.1)	(.1)	(.1)
TOTAL INCOME DIFFERENCE:	(50.5)	(2.4)	38.8	11.6	11.8	.6

(Revised 5-20-82)

1982 LONG RANGE PLAN
REDUCTION DIVISION
COLUMBIA FALLS OPERATION

INCOME ANALYSIS NARRATIVE

In general, the current economic conditions will have drastic effects on income in 1982 with some carryover impact in both 1983 and 1984. Due to the aluminum market slump, production will be curtailed to 60% until the fourth quarter of 1983.

The only variance break in terms of income in 1982 is the price increase for intra-company sales of $2.3M. Prices are expected to begin to recover in 1983 and continue to increase throughout the plan period. Volume is down for 1982 and 1983 because of weak demand in the market. The 1984 increase reflects our return to full production with volume increases for the rest of the period relating to scrap processing.

Variable cost increases for alumina are due to forecast price increases for the plan. The variances in other raw materials in 1982 are mainly due to price. The changes in 1983 and 1984 are due to the restart program with the continued increasing costs reflecting the scrap purchases. Unfavorable labor costs in 1982 and 1983 are because of an increased manhours per ton due to curtailed operations. The return to full production is reflected in 1984. The increases for the remainder of the plan are generally related to cost rather than production. A higher electricity price contributes $18.2M of the $19.8M variance in 1982. This constantly increasing power cost has been addressed in the 1981/1982 LRP comparison.

All fixed cost changes throughout the plan period are generally due to inflation. The only major exception to this statement is the increased cost for depreciation and property taxes as they relate to placing the new cast house facility in service in 1984 and 1985.

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